to create improvisatory expressions for joy, sadness, anger, fear, and tenderness. Body movements were motion captured (using Qualisys ProReflex), and features for hand speed, acceleration and jerk as well as the drum area used were extracted. General emotion regulation tendencies for reappraisal and suppression were measured through the Emotion Regulation Questionnaire (ERQ). ANOVAs showed significant differences between emotions in several movement features. Most distinctive differences were based on the activation level dividing emotions into high arousal (joy, anger, fear) and low arousal (sadness, tenderness). Correlations and linear regressions showed that the general emotion regulation style Reappraisal was positively connected to congruent expression of sadness and tenderness, as indicated by lower hand speed, jerk and use of drum area. The results demonstrate that already through a relatively basic musical act of djembe drumming, adolescents can express emotions bodily through musical movement. Findings further suggest that musical emotion expression skills may depend on general emotion skills. Findings are relevant for both education and therapy.

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**Subjects:** Emotion, Embodied cognition; Music and development; Music and movement

## I3-2 Performer-Generated Aspects of Musical Structure in Rock and Pop Music

11:45 AM Nicholas Shea*[1], Leo Glowacki[1], Daniel Shanahan[1]
KC909 [1] *Ohio State University*

Musical communication has been characterized as an inference of musical structure (e.g., form, harmony) from audible surface-level features (e.g., pitch, rhythm), in a process Temperley (2004) calls "communicative pressure." The focus of musical structure is most often harmony, which theoretically governs form and syntax in a given style (Lerdahl & Jackendoff, 1983; Nobile, 2016; White & Quinn, 2018). However, embodied music cognition research and first-hand accounts by songwriters have advocated that performers are also key agents to conveying and generating musical structure (De Souza, 2017; Sudnow, 1978). In a style such as rock—where songwriters often have limited musical training and composition frequently occurs from the instrument—an ecological-based theory of affordances (Gibson, 1986) suggests that the physical constraints of instruments (Parncutt et al., 1997) may have more structural determinacy than a given harmonic progression. This study investigates the relationship between the cognitive and physical aspects of music-making in a corpus of fully-scored rock songs, as part of a broader effort to do the same for other styles, while also providing methodology for adding notational specificity to existing popular music corpus studies. Here, a Cartesian distance model tracks topographical distance on the guitar and keyboard to coordinate performative shifts with metric and harmonic transitions. These models are then applied to scores (n = 75) of crowdsourced transcriptions. We expect that (1) performers prefer to maximize affordance when playing chord progressions, irrespective of root motion, and (2) shifts in instrumental affordances correspond with the song's formal boundaries. An ongoing coordinated behavioral study also implements motion capture technology to track how performers generate musical texture in the context of style as they play corpus-derived harmonic progressions, with the assumption that (3) "pop" chord progressions are more easily executed on the piano, while "rock" chord progressions are more easily executed on the guitar.

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**Subjects:** Composition and improvisation, Computational approach; Corpus analysis/studies; Embodied cognition; Harmony and tonality; Music and

## I3-3 Motion Patterns of Feet's Movements and Metrical Structure in Electronic Music's Dance Style

12:00 PM María Marchiano*[1], Isabel Cecilia Martinez[1]
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Motivation. In some dance styles, musical meter is encoded in the dancer's space: some parts of the body go through the same spatial points on the same beats (Naveda and Leman, 2010), producing a metrically aligned motion-pattern (MP). As to electronic dance music (EDM), arms, chest and head movements seem to be highly spontaneous but still aligned with musical metre (Marchiano and Martínez, 2018). In this study we aim at extending the analysis to EDM feet movements to see whether and how MPs are metrically aligned. Methodology. Stimulus: Audiovisual recording of an EDM party in La Plata City, Argentina. Analysis: Microgenetic observational analysis of 27 minutes of 31 people's feet's movements, aiming at describing motion regularities and ways of synchronization with music metrical levels. Results. All subjects' motions

showed exclusively 2 looped MPs, both defined by the entrainment to the beat at the footstep level: (i) 2 (1-1) beat cycle (strong-weak/right-left foot alternation) stationary; and (ii) 4 (2-2) beat cycle (strong/weak right - strong/weak left foot alternation), with feet displacement on the horizontal axis. Implications. EDM's dancers embody the metrical structure of the music through their feet's spatiotemporal location. The presence of MPs in a dance style non-taught but still developed in parties, attest the social, non-verbal instantiation of musical features through embodied alignment with music. References. Marchiano, M. and Martínez, I. C. (2018). Expressive alignment with timbre. Proceedings of ICMPC15/ESCOM10 (272-278). Graz, Sydney, Montreal and La Plata. Naveda, L. and Leman, M. (2010). The Spatiotemporal Representation of Dance and Music Gestures using Topological Gesture Analysis (TGA). Music Perception, 28(1), 93-111.

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**Subjects:** Music and movement, Beat, rhythm, and meter; Embodied cognition

## I4 Symposium: Open Science Part 1

11:30 AM Dominique T Vuvan*[1], David J Baker[2], Haley Kragness[3], Psyche Loui[4], Finn Upham[5], Robert Slevc[6]

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The goal of this symposium is to facilitate discussion of open scientific practices in the SMPC community, and to provide templates and tools to facilitate their adoption. We believe that such an effort will advance our field by fostering a rigorous and collaborative spirit of inquiry in SMPC. The first part of this symposium will present the principles of open science and practices that arise from the application of these principles. We will explore the full life cycle of an open science project, describing examples of pre-registration, data sharing, and open access publication from real projects conducted by members of SMPC. This will be followed by a 15 minute Q & A discussion on working open science practices into the research process. Presentation slides, links, and other materials pertaining to this symposium can be accessed at https://osf.io/9bvue/.

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### I4-1 Pre-registration

Dominique T Vuvan[1]

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Study pre-registration is one of the core practices of open science. In this subsection I will start by defining pre-registration and describing the ecosystem of tools that support its implementation. Next, I will motivate the use of pre-registration on both scientific and pedagogical grounds. Scientifically, pre-registration produces better quality science by encouraging practices such as thoughtful design and analysis planning and the separation of confirmatory and exploratory analyses, as well as acting as a safeguard against avoidable inferential errors (Type I errors in particular). Pedagogically, pre-registration is an important process for training students, in particular because it makes explicit best practices for theory building and study design that trainees usually learn implicitly and unsystematically. Additionally, pre-registration has the effect of increasing student independence, and providing a template that can be iterated upon for later stages of the project (i.e., writing), as well as across multiple projects. Finally, I will delineate the steps through which a PI and a student can collaborate to pre-register a study on the Open Science Framework using an actual in-process experiment in my own lab.

### I4-2 Open data

Psyche Loui[1]

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Digital data are being generated at an exponential rate, with the volume of data doubling every two years (Voytek, 2016). Since conventional publications are constrained by limitations in space, and by the pressures of the review process placed on editors and reviewers alike, the vast majority of raw data being collected are currently not made available via the journal publishers. This creates an opaque system wherein findings can be difficult to replicate and interpret. In contrast, open data has two key benefits, 1) improving reproducibility, and 2) enabling extension and meta-analysis. I will demonstrate two projects from my lab that have used two platforms for data sharing: figshare and neurovault, which have a low barrier for adoption and enable the sharing of behavioral and neuroimaging data respectively. I will also suggest some useful practices for